ORIGINAL ARTICLE

Gender differences in aggressiveness in children and adolescents at risk for schizophrenia

Comportamentos agressivos em crianças e adolescentes com risco para esquizofrenia: diferenças entre gêneros

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Abstract

Objective: *This study aimed to investigate whether differences in aggression-related behavioral problems occur between boys and girls at high risk for schizophrenia living in the city of São Paulo, Brazil.* ***Method:*** *Using the Child Behavior Checklist, we compared the prevalence of behavioral problems between genders for the offspring (6-18 years) of mothers with diagnosis of schizophrenia and a comparison group of children born to women with no severe mental disorders recruited at the gynecology outpatient clinic of the same hospital. The Structured Clinical Interview for DSM-IV Axis I Disorders, Patient Edition was applied for the evaluation of diagnostic status of mothers.* ***Results:*** *Male children of women with schizophrenia had a lower prevalence of aggressive behavior compared to females (4% vs. 36%; p = 0.005), whereas no gender differences regarding aggression were detected in the comparison group (24% vs. 32%; p = 0.53). Logistic regression analyses showed that male gender and being a child of women with schizophrenia interacted so as to favor lower prevalence of aggressive behavior (p = 0.03).* ***Conclusion:*** *These findings reinforce the notion that behavioral gender differences related to schizophrenia are already detectable in childhood.*

Descriptors: *Schizophrenia; Child; Adolescent; Gender; Behavior*

Resumo

Objetivo: *Investigar diferenças da ocorrência de comportamentos agressivos entre crianças e adolescentes do sexo masculino e feminino com risco genético para desenvolver esquizofrenia.* ***Método:*** *A prevalência de comportamentos agressivos foi medida utilizando o inventário de comportamentos para crianças e adolescentes,* Child Behavior Checklist*, e comparada entre os gêneros para o grupo de crianças filhas de mulheres com esquizofrenia e para um grupo de crianças filhas de mulheres atendidas no serviço de ginecologia do mesmo hospital. A entrevista clínica estruturada para DSM-IV* (The Structured Clinical Interview for DSM-IV Axis I Disorders Patient Edition) *foi utilizada para confirmar o diagnóstico materno.* ***Resultados:*** *Os filhos de mulheres com esquizofrenia do sexo masculino apresentaram prevalência menor de comportamentos agressivos quando comparados às meninas (4% x 36%; p = 0,005), o que não ocorreu para o grupo comparativo (24% x 32%; p = 0,53). A análise de regressão logística mostrou que pertencer ao sexo masculino e ser filho de mulher com esquizofrenia interagiram de forma a favorecer menor prevalência de comportamentos agressivos (p = 0,03).* ***Conclusão:*** *Esses achados corroboram para a noção que as diferenças comportamentais entre os gêneros na esquizofrenia podem ser detectadas precocemente durante a infância.*

Descritores: *Esquizofrenia; Criança; Adolescente; Gênero; Comportamento*

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Introduction

Over the past few decades, several studies have documented the presence of significant gender differences in regard to clinical aspects of schizophrenia. Relative to female patients, male subjects are more likely to present an earlier onset of the disorder,[1,2] more severe negative symptoms,[3-6] a greater number of hospitalizations,[7] poorer occupational and social outcome,[8] and poorer premorbid functioning.[9-11] Also, several neuroimaging studies have shown that male subjects with schizophrenia present more structural brain abnormalities than females.[12-16] Such clinical and neurobiological findings, added to the evidence that there are gender-related neurodevelopmental variations in the human brain,[17-18] have been taken as indicative of an etiological heterogeneity for schizophrenia, with males being more prone to a more neurodevelopmental form of the disorder.[10,19-21]

One area of particular interest to neurodevelopmental theories of schizophrenia concerns the investigation of children and adolescents with first-degree relatives affected by the disorder.[22] Several studies have shown that such children and adolescents at risk for schizophrenia have a greater degree of cognitive, social and motor development problems when compared to not-at-risk subjects of the same age range.[22-28] These early deficits have been interpreted as possibly reflecting brain pathogenic processes of neurodevelopmental origin that would indicate a vulnerability to the development of schizophrenia later in life.[29-31] Studies investigating gender differences in populations at risk for schizophrenia[32-36] have shown that at-risk male children may display more neurocognitive deficits before illness onset than females. Such findings have reinforced the notion that males are more susceptible to a more neurodevelopmental form of schizophrenia.[19-21]

Another aspect in studies with populations at risk for psychosis concerns behavioral features that may be specifically related to negative syndrome of schizophrenia,[37] such as lack of aggression,[38] social retraction, and physical anhedonia.[33,39-41] This is an issue of critical importance, as the severity of negative symptoms is a strong indicator of poor treatment response and prognosis in schizophrenia.[42,43] The investigation of this issue in at-risk groups, however, has produced inconsistent findings. While some studies found low levels of aggressive behavior and increased social withdrawn, hypoactivity, and physical anhedonia in children from families affected by schizophrenia,[33,39-41,44-45] others have reported high levels of aggressive behavior in groups of at-risk children.[46-48] There have also been findings that children who display either increased levels of social withdrawal or instead disruptive and aggressive behavior may be both more likely to develop schizophrenia later in adulthood.[49]

Findings have also been inconclusive in regard to investigations of gender differences in aggression-related behaviors in children at risk for schizophrenia. There have been suggestions that female children who develop schizophrenia in the future would be quieter, more introverted, passive and withdrawn relative to control children, while at-risk boys would be more prone to externalizing[24] or unpleasant, negativistic, antisocial, irritable and disruptive behaviour.[36,50-51] Conversely, other studies have reported high levels of physical anhedonia,[33] schizoid traits[9] and withdrawal[38] in boys at risk for schizophrenia relative to control male children. The latter study also reported a bimodal distribution of aggressive behavior in at-risk male children, with a greater prevalence of either absence of or extreme aggression compared to control males.[38] One limitation in this field is that some studies were restricted to comparisons of cases and controls of the same sex, with no direct comparisons between males and females at risk for schizophrenia, matched for demographic variables.[50-51] Another limitation is the lack of standardized scales for symptom evaluation in some investigations.[36,51] Therefore, further studies are needed in order to better clarify whether aggression-related emotional aspects in at-risk children would indeed represent gender-specific vulnerability markers for more neurodevelopmental, early onset, poor-prognosis forms of schizophrenia.

The present study aimed to investigate whether differences in aggression-related behavioral problems occur between boys and girls at high risk for schizophrenia living in the city of São Paulo, Brazil. We have directly compared males and females both in this at-risk sample and in a control group of offspring of non-affected mothers, using the Child Behavior Checklist (CBCL). A distinctive aspect of this study is the fact that subjects resided in a geographical region with an unequal distribution of wealth and social facilities and moderate to high levels of violence,[52-53] features that are known to be related to increased expression of aggressive behavior in children in general.[54-55]

Method

1. Study sample

All women registered as outpatients at the Department and Institute of Psychiatry of the Universidade de São Paulo between January 2003 and December 2005, with a diagnosis of schizophrenia and who had children aged between 6 and 18 (n = 65) were recruited for the study. Potentially eligible women whose offspring lived outside São Paulo (n = 4) or who did not meet DSM-IV[56] criteria for schizophrenia (n = 4) were excluded. Seven additional eligible female patients (12.3%) refused to take part in the study, resulting in a final sample of 50 subjects. If the woman had more than one child within the age range 6 to 18, only one offspring was randomly selected to have his/her data included in the study.

Women treated as outpatients at the Department of Gynecology of the same medical institution during the same period of time, with no history of severe mental disorders and who had children in the specified age group were recruited for the control group (n = 82). Similarly to the schizophrenia group, when the woman had more than one child aged 6-18, one of her children was selected to take part in the study. A total of 22 mother-offspring pairs were excluded from the control group, five because the mother met DSM-IV[56] criteria for a severe mental disorder, 16 because the offspring lived outside São Paulo, and one because the father had a history of schizophrenia. Ten eligible families refused to participate (16.6%), resulting in a total of 50 mother-offspring pairs included in the control group.

2. Assessments

The parents or main carers of the children from the two groups completed the CBCL, a screening instrument devised to detect mental health problems in childhood and adolescence.[57-58] The questionnaire was answered by the mother when she was the main carer for the child and did not have acute psychotic symptoms as assessed using the SCID interview (n = 31); if the mother with schizophrenia suffered from acute psychotic symptoms, the questions were answered by an alternative adult who also cared for the child (n = 19). The CBCL was scored with regard to presence of each of its eight separate syndromes (anxious/depressed, withdrawn/depressed, somatic complaints, social problems, thought problems, attention problems, rule-breaking behavior, and aggressive behavior). Each syndrome was classified as being present when the child achieved clinically significant (T scores ≥ 70) or borderline (T scores

between 65 and 69) ratings.[57] We also computed overall CBCL scores for internalizing problems (given by the sum of scores on the anxious/depressed, withdrawn/depressed, and somatic complaints syndromes), externalizing problems (sum of rule-breaking behavior and aggressive behavior syndromes), and total problems (clinical T score ≥ 64, and borderline T score between 60 and 63).

Socioeconomic level of the families was determined based on the Household Economic Classification Questionnaire, developed by the Brazilian Association of Market Research Companies (*Associação Brasileira de Empresas de Pesquisa* - ABEP),[59] which is a ranking scale with five levels, based on the purchase power of the Brazilian population and on the educational level of the head of the family. In the present study, subjects were dichotomized as having high and medium socioeconomic level (score ≥ 11) or low socioeconomic level (score ≤ 10). We also obtained demographic data in regard to whether the child lived with his/her mother, as well as information on the presence of educational delay of the children.

The Structured Clinical Interview for DSM-IV Axis I Disorders, Patient Edition (SCID-I/P)[60] was applied to confirm mother's diagnosis of schizophrenia for the study group and to exclude women with severe mental disorders from the comparison group. Current disease severity of the mothers was assessed using the Global Assessment of Function Scale (GAF).[56] All questionnaires were applied by extensively trained psychiatrists or psychologists, who were blind to maternal diagnosis.

The study was approved by the Universidade de São Paulo Hospital Ethics Committee (process number 037/03), and a relative responsible for the child and the schizophrenic patient signed an informed consent before being included in the study.

3. Statistical analysis

Data were analyzed using the SPSS program, version 10.0. Sociodemographic and clinical variables were initially compared between the two groups as a whole (schizophrenia vs. controls, including both males and females), and subsequently between males and females within each group separately (children of patients with schizophrenia and children of patients in the comparison group). The comparisons of CBCL scores were initially conducted for the specific syndrome associated with aggression (aggressive behavior), and subsequently for the remaining seven individual syndromes as well as for the overall scores (externalizing problems, internalizing problems, and total problems). Comparisons were conducted using Pearson's chi-square test or chi-square test with continuity correction for categorical variables, and Mann-Whitney test for continuous variables.

In order to investigate the factors associated with presence of aggressive behavior in our sample, controlling for the confounding variables of socioeconomic level and educational delay, we estimated univariate and multiple logistic regression models, specifically testing the significance of the two following interactions: group by gender and gender by living with the mother.

Results

1. Sociodemographic data: overall comparisons between groups

Children's mean age was 12.6 (± 3.5 years) in the two groups. Also, in both groups the proportion of boys and girls was exactly the same (50%). There were no statistically significant differences between the group of children from mothers with schizophrenia and the comparison group in regard to mother's current age (40.86 ± 6.17 vs. 39.66 ± 5.86 years, $p = 0.52$), current socioeconomic level (with 76% of the families belonging to low classes in both groups), mother's educational level of education (72% vs. 76% with up to 9 years of education, $p = 0.64$), or educational level of the head of the family (76% vs. 78% with up to 9 years of education, $p = 0.81$). However, there were significant differences between the at-risk group and the comparison group in regard to mother's current marital status (44% vs. 86% living with a partner, $p < 0.001$), mother's occupation (82% vs. 56% unemployed, $p = 0.05$), and the proportion of children not residing with their mother (18% vs. 2%, $p = 0.02$).

2. Sociodemographic data: comparison between genders within each group

There were no significant differences when sociodemographic characteristics of boys and girls were compared against each other, either in the schizophrenia group or in the control sample (Table 1), except for the fact that there were significantly more girls than boys in the schizophrenia group who lived with their mothers (Table 1). In the study group, mean age was 12.9 (± 3.2 years) for the boys and 12.2 (± 3.9 years) for the girls ($p = 0.57$). In the comparison group, mean age was 13.0 (± 3.3 years) for the boys and 12.2 (± 3.7 years) for the girls ($p = 0.44$).

3. Clinical data for mothers

With regard to current diagnoses for the group of women with schizophrenia, 35 (70%) fulfilled DSM-IV criteria for paranoid schizophrenia, five (10%) for disorganized schizophrenia, and 10 (20%) for residual schizophrenia. Their mean GAF scores were 52.72 (SD = 18.4, range 30-90).

In the comparison group, four mothers (8%) fulfilled DSM-IV criteria for major depressive disorder of moderate severity. Other lifetime comorbid diagnoses included: panic disorder without agoraphobia (n = 2, 4%); social phobia (n = 2, 4%); specific phobias (n = 4, 8%); generalized anxiety disorder (n = 2, 4%); and anxiety disorder not otherwise specified (n = 1, 2%). Their mean GAF scores were 87.18 (SD = 11.6, range 60-100).

4. Behavioral problems identified with the CBCL

In the between-gender comparisons within each group, we found that more girls in the schizophrenia group had aggressive behavioral problems than boys ($p = 0.005$), while there were no gender differences in the comparison group (Table 2). There was also significantly greater prevalence of externalizing problems in girls relative to boys in the schizophrenia group ($p = 0.04$) but not in the control group. There were no other CBCL differences between genders in either of the two groups (Table 2).

Mean scores for aggressive behavior were lower than the cut-off level of clinical significance for both girls and boys of the two groups as seen above. Mean T scores were 61.76 (9.76) for girls of mothers with schizophrenia; 59.68 (8.13) for girls of mothers without severe mental disorders; 55.12 (4.4) for boys of mothers with schizophrenia; and 59.88 (8.12) for boys of mothers without severe mental disorders.

In the overall comparisons of CBCL variables related to aggression between the schizophrenia and control groups (combining male and female children), there were no differences either in regard to prevalence of aggressive behavior (20% vs. 28% respectively, $\chi^2 = 0.877$, df = 1, $p = 0.35$) or externalizing problems (34% vs. 42%, $\chi^2 = 0.679$, df = 1, $p = 0.41$).

Regarding the interaction between child gender and group of study in the regression analysis, the male sex was found to be a protective factor against the presence of aggressive behavior in the children at risk for schizophrenia (OR = 0.09; $p = 0.03$) (Table 3).

Table 1 - Differences between genders with regard to the demographic data of mothers and children

	Study group					Comparison group				
	Female		Male			Female		Male		
	n	(%)	n	(%)	p*	n	(%)	n	(%)	p*
MOTHER										
Educational level										
Up to 8 yrs	18	(72.0)	18	(72.0)		21	(84.0)	17	(68.0)	
9 or + yrs	7	(28.0)	7	(28.0)	1.00	04	(16.0)	8	(32.0)	0.19
Socioeconomic level										
High	6	(24.0)	06	(24.0)		6	(24.0)	6	(24.0)	
Low	19	(76.0)	19	(76.0)	1.00	19	(76.0)	19	(76.0)	1.00
Marital status										
Living with a partner	13	(52.0)	9	(36.0)		19	(76.0)	24	(96.0)	
Living without a partner	12	(48.0)	16	(64.0)	0.25	6	(24.0)	1	(4.0)	0.10
Occupation										
Employed	2	(8.0)	7	(28.0)		14	(56.0)	8	(32.0)	
Unemployed	23	(92.0)	18	(72.0)	0.14	11	(44.0)	17	(68.0)	0.09
GAF										
Under 50	11	(44.0)	11	(44.0)		0	0	0	0	
Over 50	14	(56.0)	14	(56.0)	1.00	25	(100)	25	(100)	1.00
Head of the family educational level										
Up to 8 yrs	18	(72.0)	20	(80.0)		18	(72.0)	21	(84.0)	
9 or + yrs	7	(28.0)	5	(20.0)	0.51	7	(28.0)	4	(16.0)	0.31
CHILD										
Lives with the mother										
Yes	24	(96.0)	15	(65.2)		22	(95.7)	24[1]	(100)	
No	1	(4.0)	08	(34.8)	0.009	1	(4.3)	0	(0)	0.49
Educational delay										
Yes	3	(12.0)	8	(32.0)		3	(12.0)	4	(16.0)	
No	22	(88.0)	17	(68.0)	0.09	22	(88.0)	21	(84.0)	
Skin color										0.95
White	18	(72.0)	21	(84.0)		11	(44.0)	17	(68.0)	
Black	4	(16.0)	3	(12.0)		4	(16.0)	4	(16.0)	
Mixed	3	(12.0)	01	(4.0)	0.50	10	(40.0)	4	(16.0)	0.15

**Pearson's chi-square test or chi-square test with continuity correction*
[1] One missing value
GAF = Global Assessment of Function Scale.

This interaction remained significant after controlling for socioeconomic status alone (OR = 0.09; 95%CI = 0.01-0.77; p = 0.03), and for educational delay and socioeconomic status (OR = 0.10; 95%CI = 0.01-0.93; p = 0.04) (Table 4). We also verified that living with the mother with schizophrenia was not associated with lower prevalence of aggressive behavior in boys (OR = 0.14; p = 0.08) (Table 3).

Discussion

This study detected significantly lower prevalence of aggressive behavior and externalizing problems in male children and adolescents at risk for schizophrenia compared to female subjects. Conversely, no gender differences in aggression-related variables were found in a control group of offspring of non-psychotic mothers treated at the gynecology service of the same medical institution. As the mean CBCL scores for these variables were not above the cut-off level of clinical significance in girls or boys of either group, our results indicate the presence of abnormally low levels of aggressiveness specifically in boys at risk for schizophrenia. Such specific gender-related differences in children at risk for schizophrenia were not determined by the socioeconomic status of the family, or the presence/absence of educational delay.

Before discussing the implications of such results, the limitations of this study should be highlighted. The relatively modest sample size limited the power of our statistical analyses, and this could have influenced the lack of significant differences in regard to other, non-aggression-related CBCL variables. The small size and wide age range of the samples also prevented us from investigating whether gender differences in aggressive behavior were restricted to specific periods of childhood or adolescence in our at-risk group. Another limitation of our study relates to the fact that data was collected from a single source (i.e. the adult responsible for the child), rather than from both the parents and their children. However, we detected gender differences in aspects classified as externalizing problems, which are known to be more often reported by parents than by adolescents and children.[61]

Also, the fact that the questionnaire was answered by mothers suffering from schizophrenia in a substantial proportion of cases could have led to disease-related differences in answering patterns between the two groups. However, this limitation may have been minimized by the fact that no mothers suffering from acute psychotic symptoms were used as respondents; previous studies with samples of mothers suffering from other psychiatric conditions (i.e. major depression) have suggested that the determinant contributor to variations in mother-reported child problems is presence of psychiatric symptoms, rather than maternal diagnosis.[62]

Finally, it must be stressed that this study was undertaken with a sample of patients attending a university-based tertiary mental health unit, which tends to serve subjects with more severe forms of schizophrenia. In addition, in our sample, we had a high proportion of mothers with the paranoid subtype of schizophrenia; therefore, care must be taken in generalizing our findings to the overall population of children of patients with all forms of schizophrenia.

Our findings of a lack of aggressiveness in at-risk boys add to the previous literature showing that males at risk for schizophrenia are particularly prone to cognitive, neuromotor and social

Table 2 - Behavioral problems detected by CBCL subscales and scales in each group according to gender

	Study group					Comparison group				
	Female		Male			Female		Male		
	n	(%)	n	(%)	p*	n	(%)	n	(%)	p*
Anxious/depressed					0.33					1.00
Yes	5	(20)	08	(32)		08	(32)	08	(32)	
No	20	(80)	17	(68)		17	(68)	17	(68)	
Withdrawn/depressed					0.53					0.54
Yes	06	(24)	08	(32)		09	(36)	07	(28)	
No	19	(76)	17	(68)		16	(64)	18	(72)	
Somatic complaints					0.46					0.51
Yes	6	(24)	03	(12)		05	(20)	07	(28)	
No	19	(76)	22	(88)		20	(80)	18	(72)	
Social problems					1.00					1.00
Yes	4	(16)	03	(12)		04	(16)	04	(16)	
No	21	(84)	22	(88)		21	(84)	21	(84)	
Thought problems					0.46					0.60
Yes	3	(12)	06	(24)		03	(12)	01	(4)	
No	22	(88)	19	(76)		22	(88)	24	(96)	
Attention problems					0.35					1.00
Yes	1	(4)	04	(16)		05	(20)	04	(16)	
No	24	(96)	21	(84)		20	(80)	21	(84)	
Aggressive behavior					0.005					0.53
Yes	1	(4)	09	(36)		06	(24)	08	(32)	
No	24	(96)	16	(64)		19	(76)	17	(68)	
Rule-breaking behavior					1.00					1.00
Yes	0	0	01	(4)		02	(08)	01	(4)	
No	25	(100)	24	(96)		23	(92)	24	(96)	
Internalizing					0.57					0.78
Yes	13	(52)	15	(60)		13	(52)	12	(48)	
No	12	(48)	10	(40)		12	(48)	13	(52)	
Externalizing					0.04					0.77
Yes	5	(20)	12	(48)		10	(40)	11	(44)	
No	20	(80)	13	(52)		15	(60)	14	(56)	
Total problems					0.08					0.57
Yes	7	(28)	13	(52)		14	(56)	12	(48)	
No	18	(72)	12	(48)		11	(44)	13	(52)	
Total	25	(100)	25	(100)		25	(100)	25	(100)	

** Pearson's chi-square test or chi-square test with continuity correction*

impairments,[9,32,34,35,63] which are seen as critical elements of the developmental schizophrenia spectrum, mainly the early-onset and poor-outcome subtype of schizophrenia.[21,30] Thus our results suggest that the lack of ability to express aggression could represent another premorbid feature characteristic of the vulnerability to a more neurodevelopmental form of the disorder of earlier or insidious onset and poorer prognosis, and more frequent in males.[19,21,64]

The detection of lower prevalence of aggressiveness in males at risk for schizophrenia relative to females is noteworthy, as boys in the general population are expected to have higher prevalence of aggressive behavior than girls.[65-67] In the context of contemporary models for schizophrenia, these findings could be seen as a behavioral reflection of genetically-determined neurodevelopmental abnormalities in at-risk children, which are different for boys and girls.[9,24,33,38,50-51]

The exact nature of the genetic influence over the expression of aggression in children at risk for schizophrenia may be further clarified in the future, when greater knowledge is achieved about the neurobiological and behavioral effects of susceptibility genes for the disorder.

Alternatively, it might be argued that our findings could have been influenced by disease-unrelated gender differences regarding genetic and environmental influences on aggressive behavior. This is, however, unlikely, as we found no differences between males and females in the control group in CBCL items related to aggression. Previous findings regarding gender differences in this field of investigation have been controversial, and some studies have reported no gender differences with regard to genetic and environmental influences on aggression in children.[68-71] However, there have been other studies showing that while genetic effects may be more important to the emerge of aggressive behavior, and possibly to the lack of this kind of behavior in boys,[72-73] girls would be more susceptible to express aggression under the influence of specific environmental variables including low socioeconomic level, lack of parental care and parental aggressiveness.[73] Such environmental conditions, which are prevalent in the low-income areas served by the hospital from where our subjects were recruited,[52-53] might have maximized the gender difference in aggressive behavior between males and females at risk for schizophrenia in the present study.

Finally, it is relevant to point out that the findings reported herein are not necessarily related to a specific gender distinction regarding aggressiveness. Instead, our results could reflect a more general behavioral profile in at-risk male children involving difficulties in social interaction, physical anhedonia and withdrawal.[33,38] The latter features have been previously discussed as being possibly related with lack of aggressiveness as assessed by the CBCL.[66]

Previous studies have reported differences in premorbid behavioral problems between children who develop schizophrenia in adulthood predominantly with negative symptoms of schizophrenia, and children who develop predominantly positive symptoms of schizophrenia.[37] The latter subjects are more likely to have displayed irritability, lack of concentration, aggressive and disruptive behavior

Table 3 - Univariate logistic regression models for presence of aggressive behavior in children in relation to sociodemographic variables and group of study

Variable	Number of subjects with aggressive behaviors	(%)	Crude OR	95%CI	p
Interaction 1*					
Control and female	8	(32.0)	1.0		
Control and male	6	(24.0)	0.67	(0.19-2.33)	0.53
Case and female	9	(36.0)	1.20	(0.37-3.86)	0.76
Case and male	1	(4.0)	0.09	(0.01-0.78)	0.03
Interaction 2**					
Lives with mother and female	8	(33.3)	1.00		
Does not live with mother and male	6	(18.8)	0.46	(0.14-1.58)	0.22
Does not live with mother and female	8	(33.3)	1.00	(0.30-3.32)	1.00
Lives with mother and male	1	(6.7)	0.14	(0.02-1.29)	0.08

**Interaction between group of study and child gender*
*** Interaction between living with mother with schizophrenia and child gender*

during childhood and adolescence, while those who develop more severe negative symptoms of schizophrenia tend to have been more withdrawn, passive and isolated as children and adolescents.[37,74] These findings have supported a view that the two types of schizophrenic symptoms would emerge as the consequence of two distinct types of processes already in course since childhood/adolescence.[74] Based on such reasoning, and on the knowledge that children and adolescents without any behavior problem express aggression in some circumstances,[54,75-76] it is possible to hypothesize that the lack of aggression detected in our study, possibly related to passivity and withdrawal, would be part of the behavioral profile in children at risk for schizophrenia with more negative symptoms, more frequently in boys relative to girls. This is consistent with the evidence that the prevalence of schizophrenia with predominant negative symptoms or predominant positive symptoms differs between genders.[4,5,10]

Conclusion

If replicated and extended with larger samples, the findings of the present study may help to further delineate the behavioral distinctions between males and females at risk for schizophrenia, and possibly provide additional clues to the understanding of neurodevelopmental processes related to this disorder. Moreover, as it is critical for human beings to preserve the ability to express aggression in adequate circumstances, our findings also stress the need for longitudinal studies addressing the potentially deleterious consequences of this deviance to the well-being of the large proportion of at-risk boys who will never develop schizophrenia.

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Table 4 - Final logistic regression model for presence of aggressive behavior in children in relation to sociodemographic variables and group of study

Variable	Univariate analysis				Multiple analysis		
	Categories	Crude OR	95%CI	p	Adjusted OR	95%CI	p
Interaction 1*							
	Control and female	1.00			1.00		
	Control and male	0.67	(0.19-2.33)	0.53	0.57	0.15-2.15	0.41
	Case and female	1.20	(0.37-3.86)	0.76	1.21	0.36-4.02	0.76
	Case and male	0.09	(0.01-0.78)	0.03	0.10	0.01-0.93	0.04
Educational delay	Yes	0.15	(0.02-1.26)	0.08	0.18	(0.22-1.55)	0.12
	No	1.00			1.00		
Socioeconomic status	Low	1.79	(0.54-5.86)	0.34	2.07	(0.59-7.27)	0.25
	High	1.00			1.00		

**Interaction between group of study and child gender*
OR = odds ratio

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